

**INSPECTION REPORT
ESSO TUTU SERVICE STATION
TUTU WELLFIELD
REMEDIAL DESIGN/REMEDIAL ACTION OVERSIGHT
ST. THOMAS, U.S. VIRGIN ISLANDS
Work Assignment No.: 010-ROBE-021D**

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INSPECTION REPORT

Esso Tutu Service Station, St. Thomas, USVI

1.0 SCOPE OF WORK

CDM Federal performed a Pre-Final Inspection of the Esso Tutu Service Station groundwater and soil treatment systems on June 17, 1999. The purpose of the inspection was to verify that the remedial systems were constructed in accordance with the EPA-approved design documents, Unilateral Administrative Order (UAO), and Record of Decision (ROD) and are generally operational.

The inspection included a visual inspection of all major treatment system components, a demonstration of mechanical equipment operation in manual and automatic mode, and a simulation of select fault conditions for process controls. Draft SVE ITP data and photographs obtained during the inspection are included as Attachments 1 and 2 to this report, respectively.

Construction of the Esso treatment systems was completed in March 1999. The Initial Testing Program (ITP) for the groundwater and SVE systems is ongoing. The purpose of the ITP is to demonstrate that the systems are fully functional, as designed and required by the UAO and ROD. Any adjustments or modifications required to achieve proper system performance will be made prior to the completion of testing. Upon completion of the ITP, Esso is required to submit a formal report to EPA for review and approval, which contains the results of the ITP and must demonstrate that the systems are fully operational.

2.0 PARTICIPANTS

The following individuals participated in the Final Inspection:

Carolyn Kwan - Environmental Protection Agency (EPA), Remedial Project Manager (RPM)
Michael W. Miner, P.E. - CDM Federal Programs Corporation, EPA Engineering Consultant
Leslie Leonard - U.S. Virgin Islands, Department of Natural Resources (DPNR)
Jose Vendrell - Esso
Marla Rivera - Esso
Rob Schreiner - TSG Water Resources, Esso O&M Contractor
Robert Zie, Ph.D. - Forensic Environmental Services, Esso Environmental Consultant

3.0 SUMMARY OF RESULTS

Esso Groundwater Treatment System

The Esso groundwater treatment system includes four shallow extraction wells (G1 - G4) and four deep extraction wells (G5 - G8). Representative vaults housing the shallow and deep extraction wells were initially opened to inspect wellhead construction. The well pumps are noted to be pneumatic-

type. All pipes, fittings, and gages were observed to be properly installed and without evidence of leakage.

A pull station vault exists outside of the trailer, which also corresponds to the low point for the double containment pipe system. The vault was not opened during the inspection, due to the heavy door (Cambell Foundry) that covers it. Esso's consultant indicated that the vault is not equipped with leak detection. Leakage is monitored by visual inspection of the vault, which would be opened using a manhole key, crowbar, or similar tool.

Outside the treatment system trailer, the influent PVC pipe entrances into the trailer were observed to be exposed to the environment. Esso's consultant indicated that a protective cover system for this location was currently being pursued. The treatment trailer was observed to be anchored to two strip footings, such that the trailer is elevated approximately two feet above grade. Esso's consultant indicated that hurricane forces had been considered by Esso's construction contractor (Bell & Hill) in designing the trailer foundation, and that the stack for the catox (located outside of the trailer) could be readily disassembled, when necessary. The catox is anchored to a concrete pad located adjacent to the east side of the trailer. The treatment trailer and catox are secured by perimeter fencing equipped with a lockable gate.

The control room included a main control panel (MCP), programmable logic controller (PLC), and autodialer. The influent lines of each extraction well were observed to enter the control room separately and be equipped with mechanical-type flow totalizer; no flow meters were installed. It is also noted that there were no meters or recorders for monitoring performance of the air stripper blower. All of the deep wells, excluding G5, were observed to be operating. During startup testing, G5 was determined to contain a significant amount of floating product. Esso's consultant indicated that efforts to removed the product are ongoing. None of the shallow wells were observed to be operating. Esso's consultant indicated that the shallow well pumps were not in place during the inspection; however, they had been previously tested and determined to be fully operational. It was further noted that these wells currently contain little or no water, likely due to the dry season and deep well pumping.

In the equipment room, all process equipment, pipes, fittings, gages, and controls were observed to be properly installed and without evidence of leakage. No leak detection was present in the building. Esso's consultant indicated that a leak detection system for inside the building is currently being pursued. The combined influent is initially received by an oil/water separator; minimal product was noted inside the recovery drum during the inspection. The water then enters a 1000-liter equalization tank, where it is dosed with sequesterant (Calsperse 500). The sequesterant consumption rate was noted to be approximately 6 gallons per week. The water is pumped from equalization tank to downstream treatment processes in cycles; high and low level switches inside the tank automatically activate and deactivate the transfer pump. The influent bag filters were noted to be 50 micron and are changed at an approximate rate of once per week. A mechanical-type flow totalizer was also noted to be located downstream of the tank. The air stripper was observed to be of low profile, removable tray-type (manufactured by QED) construction. Air flow is induced through the air stripper by a

blower, which was noted to be operating at 20 inches of water. The corresponding air flow rate was not known at the time of inspection. An interlock between the blower and the equalization tank transfer pump was added by Esso during startup testing to prevent the blower from operating continuously in between treatment cycles, resulting in rapid scaling of the air stripper trays. Offgas from the air stripper is currently discharged to the atmosphere, but can also be directed to the catox for treatment, when required based upon air samples results (routinely collected for air discharge permit compliance). From the air stripper, the water is pumped through the effluent bag filters and two 55-gallon activated carbon units placed in series. A pressure regulating valve (PRV) is located upstream of the bag filters to recycle water to the equalization tank, in the event that the filters or carbon units become clogged. Esso's O&M contractor indicated that the PRV had been field set to open at 10 psi, and that the carbon units would not structurally fail unless the system reached 12 psi. The system pressures upstream, in between, and downstream of the carbon units were noted to be 5 psi, 1 psi, and 0.5 psi, respectively, at the time of inspection. The effluent bag filters were also noted to be 25 micron and replaced at an approximate frequency of once per week.

Fault simulation testing of the process controls included the following demonstrations: low equalization tank level (transfer pump and air stripper blower off), high equalization tank level (transfer pump and air stripper blower on), high high equalization tank level (system shutdown), high differential pressure across the bag filters and carbon units (system shutdown), low air stripper sump level (transfer pump off), high air stripper sump level (transfer pump on), high high air stripper sump level (system shut down), and low air flow to the catox (system shutdown). For each simulation, the appropriate response was observed by the process equipment, MCP, PLC, and autodialer.

Esso Soil Treatment System

The representative vaults housing the soil vapor extraction (SVE) wells (V1-V5), bioventing extraction (BE) wells (BE1-BE5), bioventing injection (BI) wells (G1/BI-G4/BI), and vapor monitoring points (VW1-VW9) were initially opened to inspect their construction. It was observed that the extraction wells were equipped with vacuum gages and flow meters, and that little (V1, 7 scfm) or no (V2 - V5, 0 scfm) air flow was occurring in the SVE wells. Esso's consultant indicated that better air flow (7 to >20 scfm) was generally being observed from the BE wells, which were being operated during the inspection as part of Esso's Initial Testing Program (ITP) to evacuate their use as SVE wells. It is noted that the SVE and BE wells are generally the same in terms of well construction (2-inch PVC) and screen interval (5 to 15 feet bgs). Esso's consultant also provided EPA, CDM Federal, and DPNR with draft copies of the measurements taken from June 8 to June 14, 1999 as part of the SVE ITP.

The SVE influent is drawn through a moisture knockout drum and air filter by the catox blower. It is then sent to the catox for treatment prior to atmospheric discharge. The catox was observed to have a separate control panel, which is located adjacent to the catox and connected as a sub-panel to the MCP. The catox was observed to be operating at 2,500 feet per minute, with an exhaust temperature of approximately 600 degrees Fahrenheit. The Esso O&M contractor indicated that fuel consumption rate for the catox was approximately 50 gallons per day.

Fault simulation testing included low air flow to the catox (system shutdown) and power outage (system shutdown). For each simulation, the appropriate response was observed by the process equipment, MCP, PLC, and autodialer.

It is noted that the bioventing system generally utilizes the same process equipment (blower, moisture knockout drum, catox) as the SVE system. It is designed to operate after the SVE system has been shut down, and includes a number of additional bioinjection (BI) and bioextraction (BE) wells, which can also be used as part of the SVE system. As indicated above, representative vaults for BI and BE wells were inspected. All of the information presented herein regarding the SVE system also applies to the bioventing system. A separate discussion regarding the bioventing system has not been included in this report.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of the Pre-Final Inspection performed by CDM Federal, the Esso groundwater and soil treatment systems have been constructed in general accordance with EPA-approved design documents, UAO, and ROD requirements, and the treatment system components are generally operational.

As indicated in Section 1.0, the ITP for the groundwater and SVE systems is ongoing. Upon the completion all of the required adjustments/modifications to the systems and the ITP, Esso will submit an ITP report to EPA for review and approval, which contains the results of the ITP and must demonstrate that the systems are fully operational.

Based upon the results of the Pre-Final inspection, it is recommended that the following punchlist items be completed by Esso:

- ▶ Active efforts to remove product from well G5 should be implemented immediately.
- ▶ Efforts to trouble-shoot the SVE system should be expedited. Any system adjustments or modifications needed to achieve the design area of influence and optimize contaminant mass removal should be identified and implemented during the short term.
- ▶ The pressure at which the PRV is set to open (10 psi) should be confirmed with the carbon drum manufacturer, if not done so already. It should be set according to the manufacture's recommendations.
- ▶ At minimum, manufacturer's data should be maintained on site that correlate air flow (cubic feet per minute) for air stripper and catox blowers (cfm) to the units of measurement on existing gages [inches of water (pressure), feet per minute (air velocity)]. Instrumentation could also be installed to measure air flow in cubic feet per minute on a continuously.

The following improvements are also suggested:

- ▶ The influent lines from each groundwater extraction well and the combined influent header should be equipped with flow meters to minimize longterm O&M efforts associated with monitoring the system, trouble-shooting operational problems, and optimizing system performance.
- ▶ The operations and equipment rooms inside the trailer should be equipped with leak protection to prevent significant damage to electrical mechanical equipment, which could occur as result of a leak inside these rooms. Leak detection should also be considered for the pull station vault.
- ▶ Installation of an air conditioner in the control room is suggested to protect the electrical and control equipment from potential damage associated with extreme heat and humidity.
- ▶ The groundwater and SVE piping exposed at the ground surface by the trailer should be equipped with added protection to prevent the PVC pipes from deteriorating as a result of extended ultraviolet light exposure.

ATTACHMENT 1

DRAFT ITP DATA FOR THE SVE SYSTEM

Field Measurements
SVE System
Esso Tutu Service Station
St. Thomas, USVI

DRAFT

6/16/99

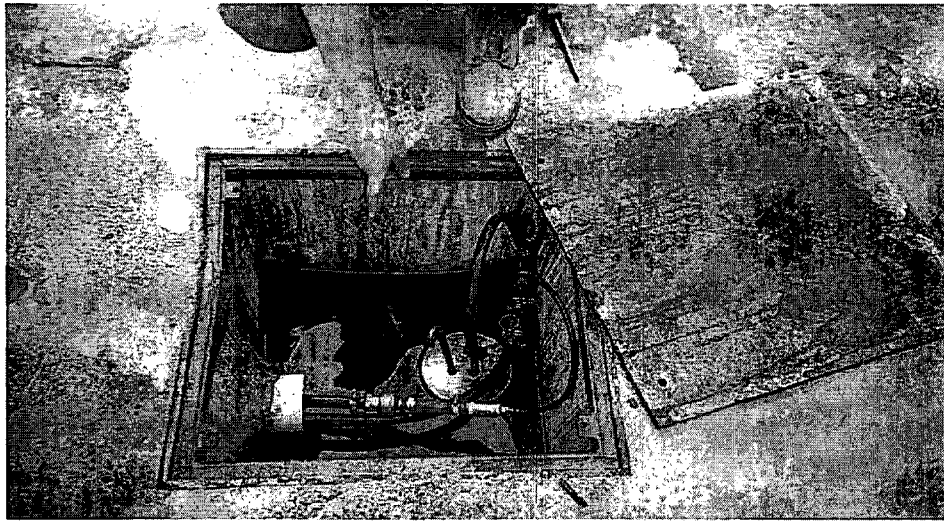
Well	Date	Flow (scfm)	Vacuum (in. H2O)	PID	Percent O ₂	Percent CO ₂	Percent CH ₄
V1	6/8/99	7	64	0	19.8	0	0
	6/9/99	7	62	0	16	3.2	0
	6/10/99	7	62	12.3	16.9	1.7	NR
	6/11/99	7	62	16.3	17.4	2.2	0
	6/14/99	7	62	10.4	17.9	1.9	0
V2	6/8/99	0-5	54	0	19.5	0	0
	6/9/99	0	54	292	16.1	3.1	2.9
	6/10/99	0	54	17.3	18.7	0.8	4.8
	6/11/99	0	54	20.6	18.9	0.8	0
	6/14/99	0	54	1.9	18.8	0.6	10.5
V3	6/8/99	NM	NM	NM	NM	NM	NM
	6/9/99	NM	NM	NM	NM	NM	NM
	6/10/99	NM	NM	NM	NM	NM	NM
	6/11/99	NM	NM	NM	NM	NM	NM
	6/14/99	NM	NM	NM	NM	NM	NM
V4	6/8/99	0	46	314	18.1	0.3	23.1
	6/9/99	0	56	460	19.1	0.2	13.7
	6/10/99	0	56	417	18	0.2	16.2
	6/11/99	0	54	438	17.4	1.2	123.3 ?
	6/14/99	0	59	435	17.2	1.1	49.4
V5	6/8/99	0	38	5.3	19.5	0	0
	6/9/99	0	34	22.8	18.7	0.1	0
	6/10/99	0	40	10	18.9	0	0
	6/11/99	0	44	22.8	18.4	0.1	0
	6/14/99	0	37	5.7	18.3	0	0
BE1	6/8/99	7	66	0	19.7	0	0
	6/9/99	9	66	86.9	15	3.3	0.6
	6/10/99	11	64	102	16.3	1.3	0
	6/11/99	11	66	90.4	16.9	2.1	0.5
	6/14/99	13	65	64.7	17	1.5	0
BE2	6/8/99	7	64	0	19.6	0	0
	6/9/99	8	64	11.1	18.3	1.3	0
	6/10/99	0-20	62	13.6	18.8	0.5	0.6
	6/11/99	0-20	64	17.6	19	0.6	0
	6/14/99	0-20	62	0.1	18.9	0.2	9.4
BE3	6/8/99	>20	58	0	19.5	0	0
	6/9/99	>20	58	14.8	19.1	0.7	0
	6/10/99	>20	68	6.5	18.9	0.1	0.5
	6/11/99	>20	58	12.5	19.2	0.1	0
	6/14/99	>20	66	16.5	19.2	0.1	16.5
BE4	6/8/99	11	60	0	19.5	0	0
	6/9/99	12	60	26.2	17	1.3	0
	6/10/99	13	60	16.4	18	0.7	0
	6/11/99	13	60	16.3	18.4	0.6	0

Field Measurements
SVE System
Esso Tutu Service Station
St. Thomas, USVI

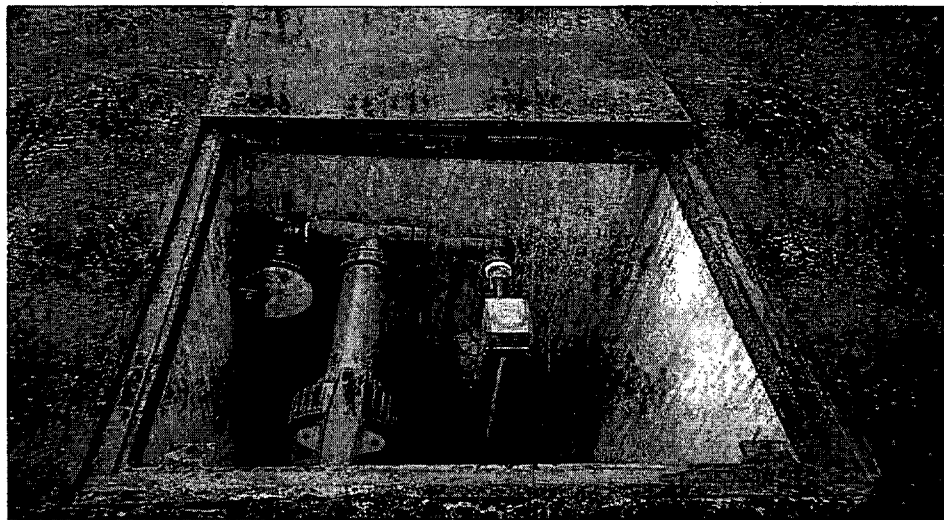
DRAFT 6/16/99

	6/14/99	13	58	13	16.6	0.3	6.2
		Flow	Vacuum				
Well	Date	(scfm)	(in. H2O)	PID	Percent O2	Percent CO2	Percent CH4
BE-5	6/8/99	14	60	0	19.5	0	0
	6/9/99	16	60	197	7.5	6.9	0.9
	6/10/99	16	59	158	12.4	4.1	0.8
	6/11/99	16	58	152	13.4	3.4	0.6
	6/14/99	17	58	98.4	14.4	2.1	0

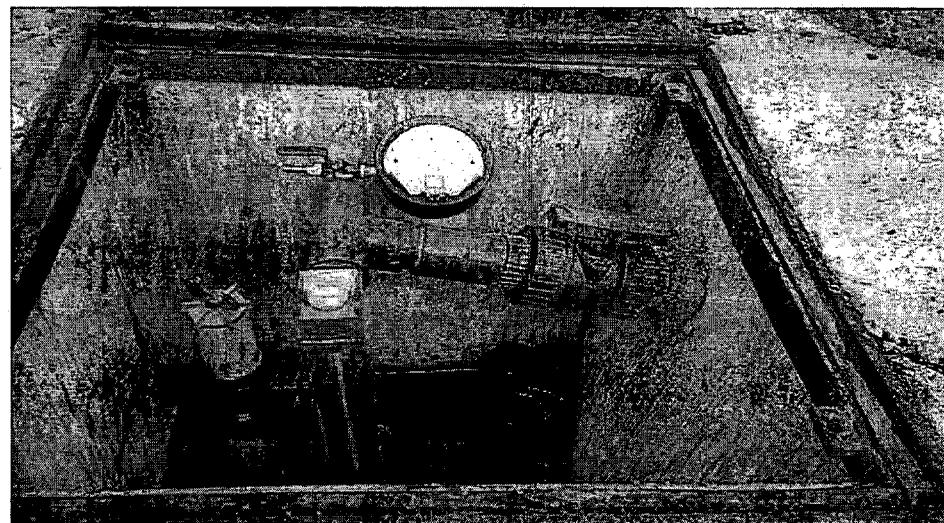
ATTACHMENT 2
SITE PHOTOGRAPHS



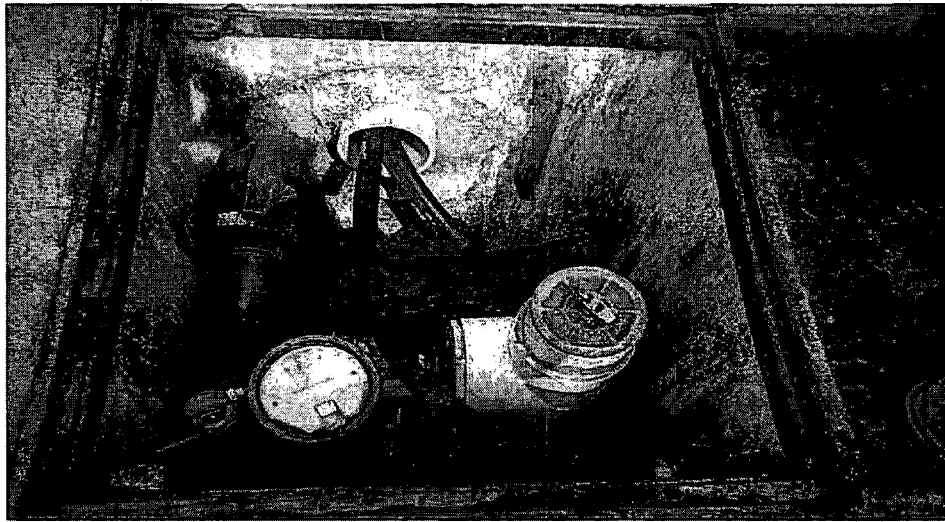
Typical deep groundwater extraction well (Location G7).



Typical SVE well (Location V5).



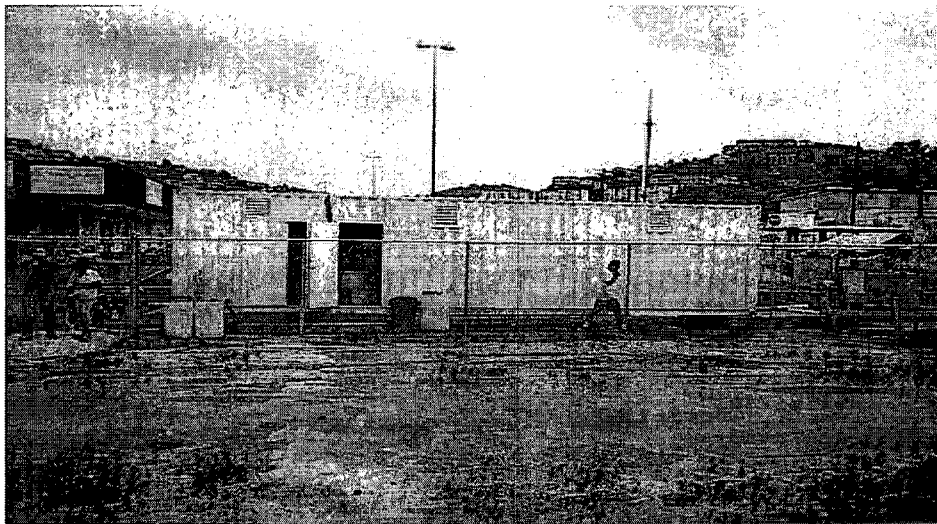
Typical bioventing extraction well (Location BE5).



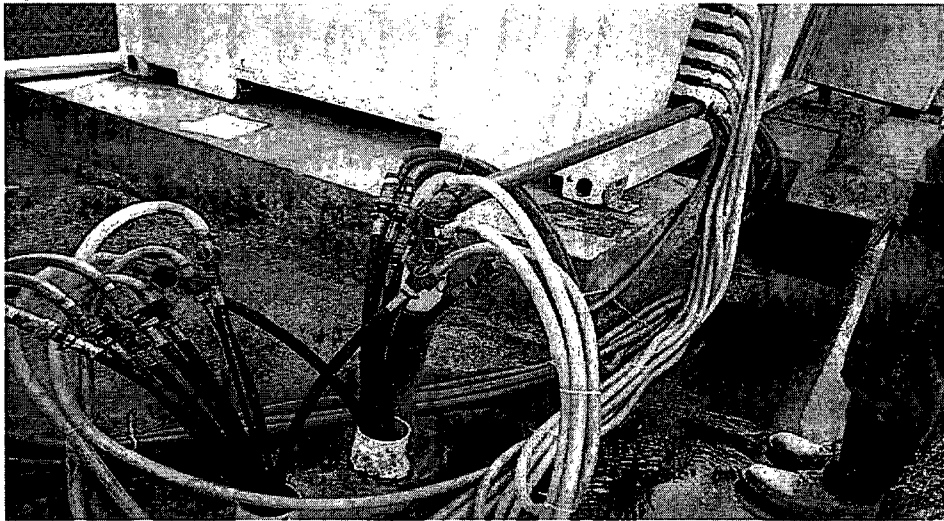
Typical shallow groundwater extraction well/bioventing injection well (Location G2/BI).



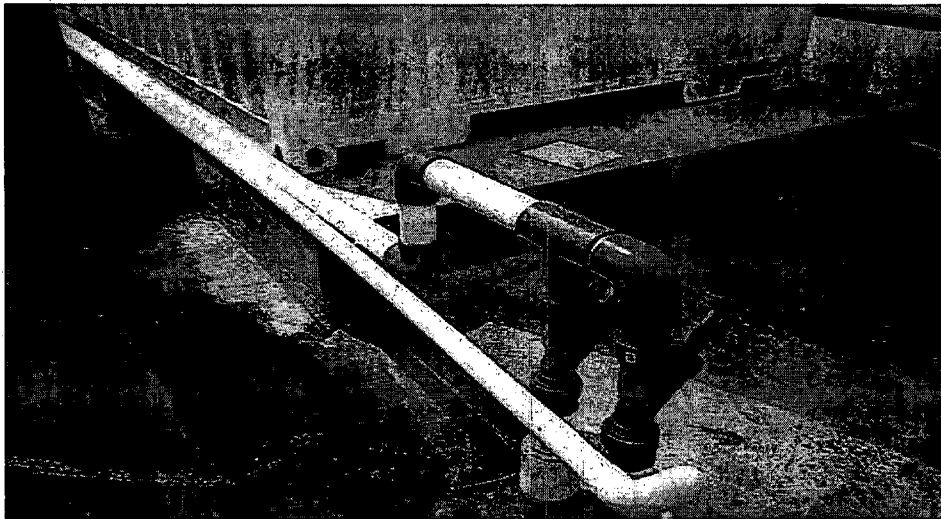
Typical vapor monitoring point (Location VW1).



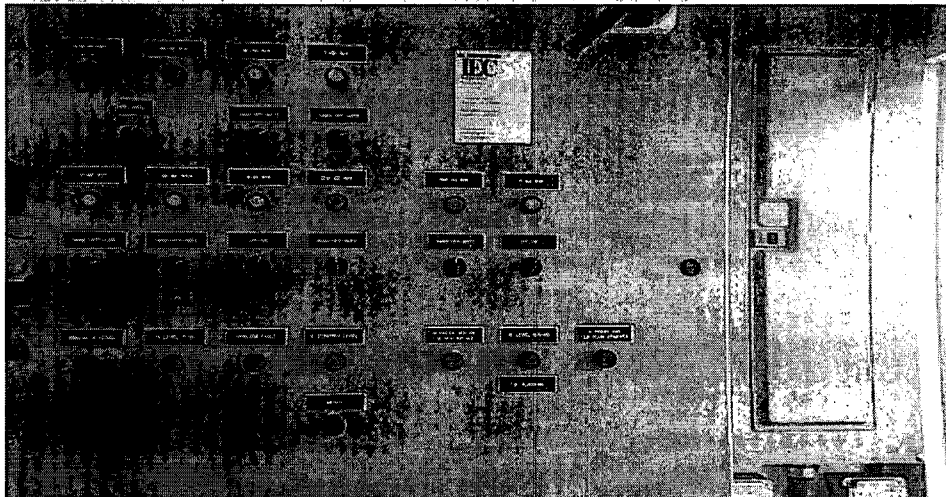
North view of treatment system trailer.



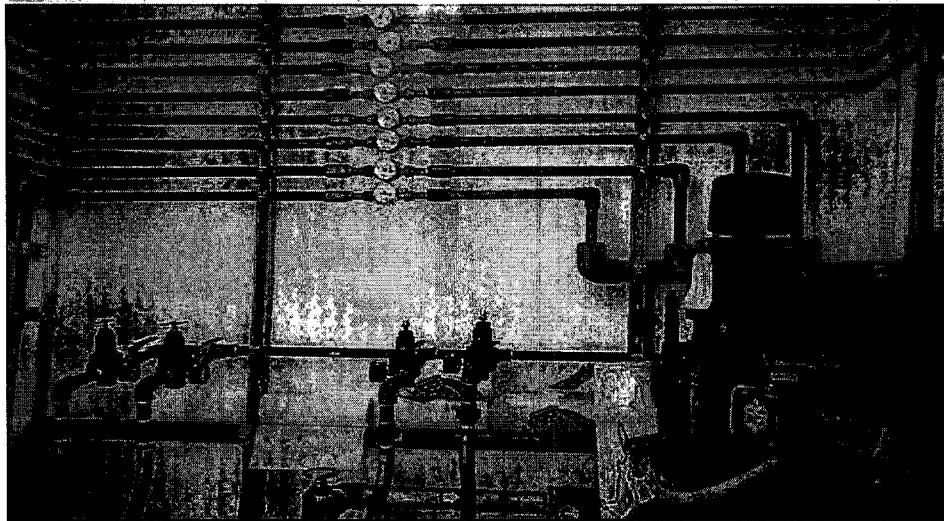
View of groundwater influent lines surfacing and entering the trailer.



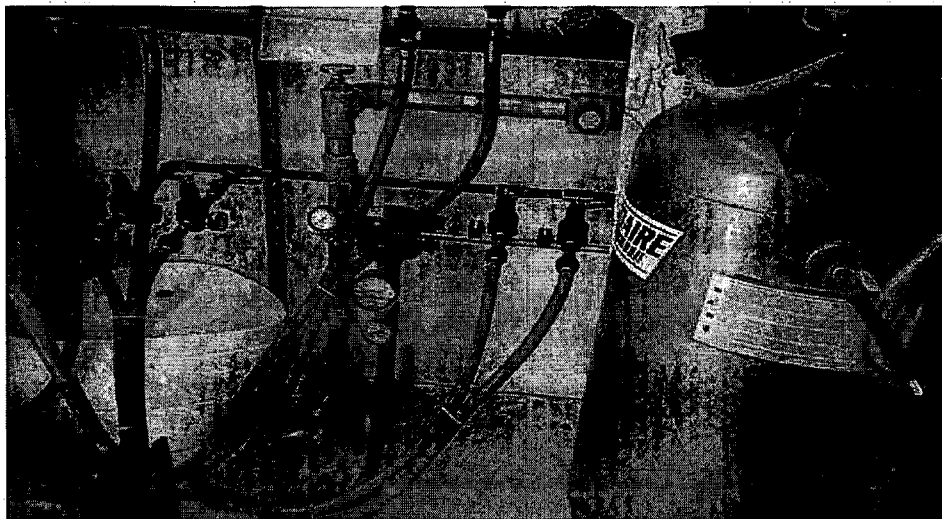
View of SVE and bioventing influent lines surfacing and running along the north side of the trailer to the catalytic oxidation unit.



Main Control Panel for the treatment system.



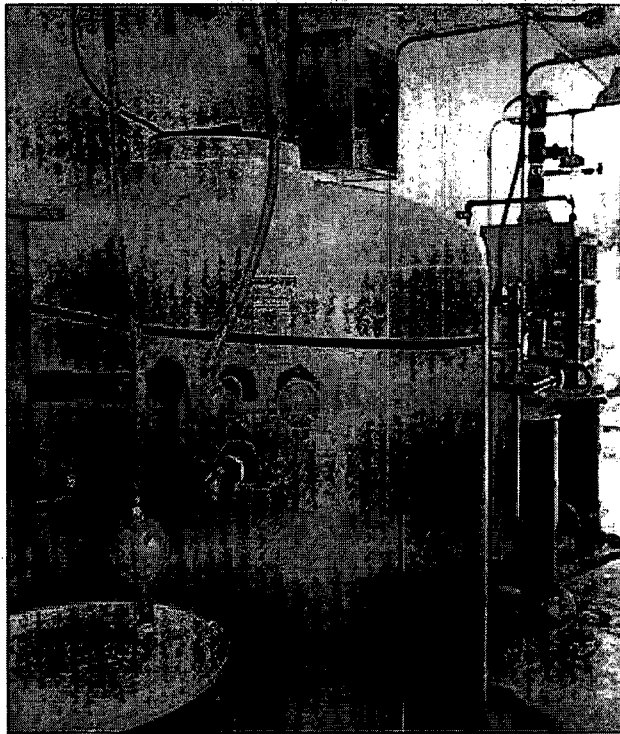
View of groundwater influent lines and flow totalizers inside the control room.



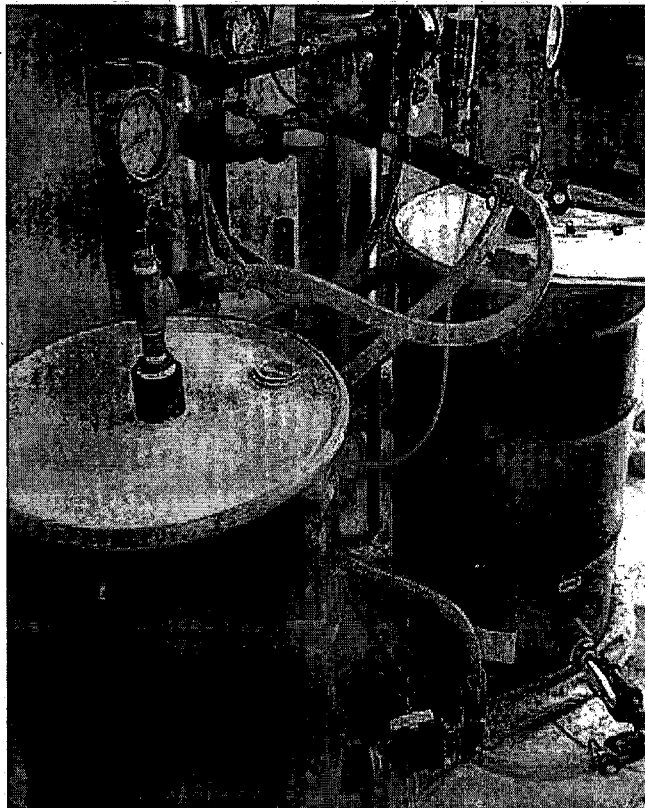
View of the compressor for the pneumatic pumps inside the control room.



View of the sequesterant tank, oil/water separator, and product recovery drum inside the equipment room.



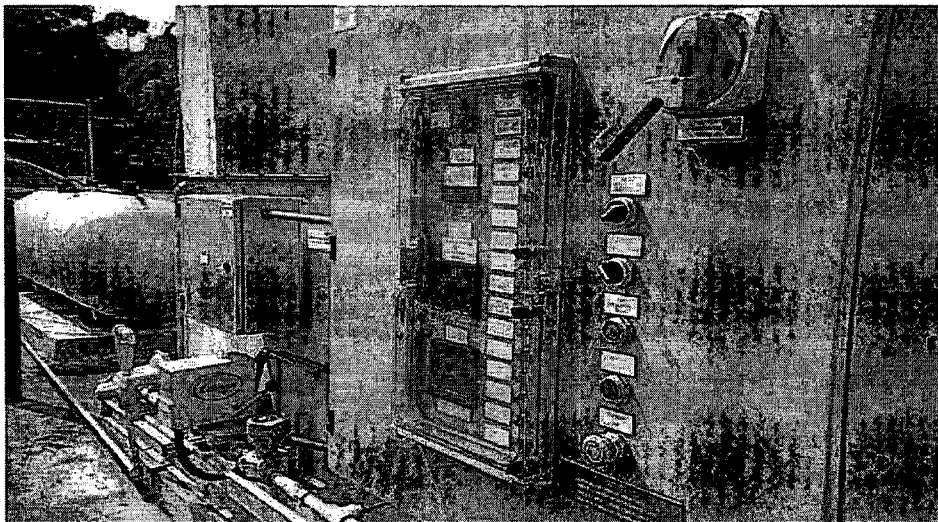
View of the groundwater stabilization tank.



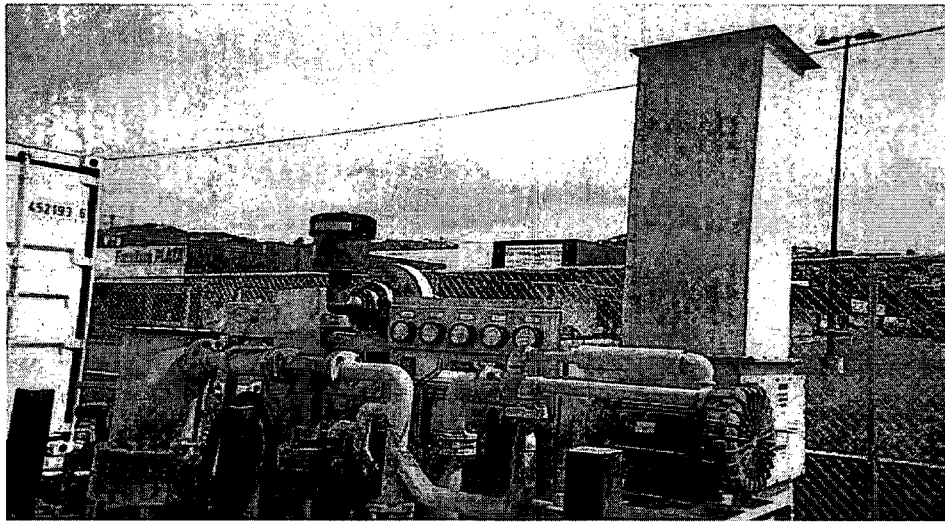
View of the liquid-phase activated carbon units.



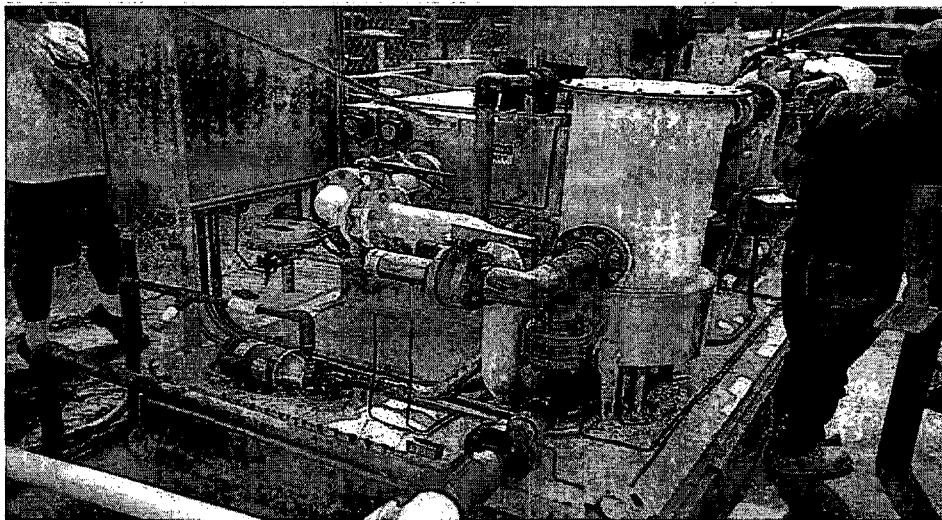
View of the air stripper.



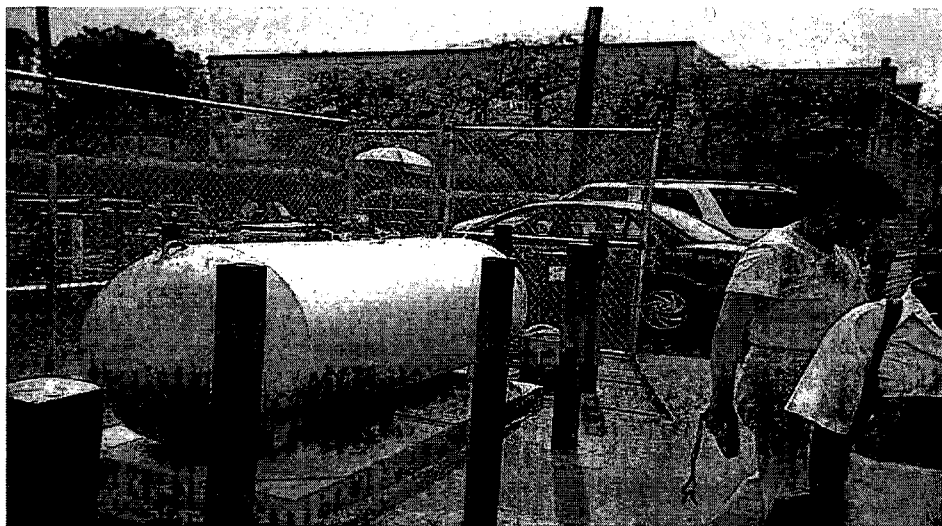
View of the sub-panel for the catalytic oxidation unit.



North view of the catalytic oxidation unit, showing the knockout drum, blower, and exhaust stack.



View of the vapor influent line entering the knockout drum.



View of the fuel tank for the catalytic oxidation unit.